REMARKS/ARGUMENTS

Support for the amendments to the Claims is found at specification page 4, line 27, page 5, line 2, and page 6, line 22. Formula (2) has been presented with parentheses as $(0.8\times[Si])+[Cr] \geq 3.0$ in order to avoid confusion. That this is the correct expression can be verified by reference to Table 1 at specification page 9 where values for "Calculated 0.8Si+Cr" are calculated as $(0.8\times[Si])+[Cr]$. No new matter has been added.

In the Advisory Action the Examiner has indicated that "there is no invention in the discovery of a general formula if it covers a composition described in the prior art", citing to *In re Cooper and Foley*. It is to be noted that *In re Cooper and Foley* was decided in 1943, and thus before the Patent Act of 1952 which forms the basis of modern U.S. patent law. While it is generally still the case that an anticipatory disclosure of a claimed specie would negate the patentability of a general formula encompassing that specie, modern U.S. patent law recognizes that, absent anticipation, patentability may be established even in the face of an initial *prima facie* case of obviousness:

> It is well settled that the PTO "bears the initial burden of presenting a prima facie case of unpatentability... . However, when a prima facie case is made, the burden shifts to the applicant to come forward with evidence and/or argument supporting patentability." *In re Glaug*, 283 F.3d 1335, 1338 [62 USPQ2d 1151] (Fed. Cir. 2002). Rebuttal evidence is "merely a showing of facts supporting the opposite conclusion." *In re Piasecki*, 745 F.2d 1468, 1472 [223 USPQ 785] (Fed. Cir. 1984). Evidence rebutting a prima facie case of obviousness can include: "evidence of unexpected results," *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1369 [82 USPQ2d 1321] (Fed. Cir. 2007), evidence "that the prior art teaches away from the claimed invention in any material respect," *In re Peterson*, 315 F.3d 1325, 1331 [65 USPQ2d 1379] (Fed. Cir. 2003), and evidence of secondary considerations, such as commercial success and long-felt but unresolved needs, *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 [51 USPQ2d 1385] (Fed. Cir. 1999). When a patent applicant puts forth rebuttal evidence, the Board must consider that evidence. *See In re Soni*, 54 F.3d 746, 750 [34 USPQ2d 1684] (Fed. Cir. 1995) (stating that "all evidence of nonobviousness must be considered when assessing patentability"); *In re Sernaker*, 702 F.2d 989, 996 [217 USPQ 1] (Fed. Cir. 1983) ("If, however, a patent applicant presents evidence relating to these secondary considerations, the board must always consider such evidence in connection with the determination of obviousness.").

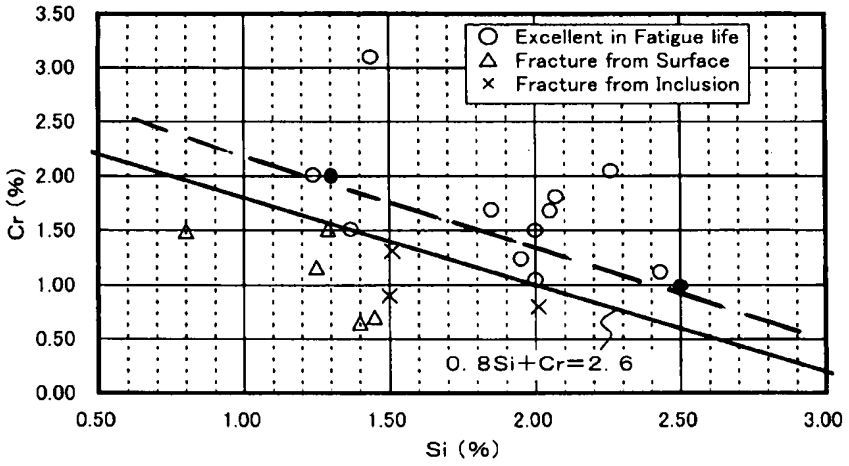
In re Sullivan, 84 USPQ2d 1034 (Fed. Cir. 2007) (vacating the Board's Decision because the Board failed to give any weight to the rebuttal evidence of record).

In this case the Examiner continues to maintain the rejections over Nagao and Hashimura on the basis that the broad disclosure of steel compositions in the references overlaps with those presently claimed. This, for the Examiner, is enough as the Examiner seems to believe that because "the prior art references are not required to recognize the benefits stemming from the instant claim limitations" any such benefits are meaningless. This, of course, is not the present law as reference to the Federal Circuit's vacature of the Board's decision in *In re Sullivan* (above) clearly demonstrates.

With regard to the alleged overlap in compositional ranges, it is Applicants' position that the data present in the specification show distinct and patentable differences in properties between steels falling within the present claims, none of which are anticipated, and similar steels whose compositions fall just outside the presently claimed compositional limitations. This data establishes the patentability of the pending claims.

Perhaps the most persuasive indicia of patentability herein is found in Table 1 of the present specification, showing that when a spring steel that meets the compositional limitations according to the present claims and satisfies the formula $0.8x[Si]+[Cr] \geq \mathbf{3.0}$ that excellent fatigue life is obtained, whereas when one operates outside of this formula the spring steels provided show fracture:[1]

[1] Note that this Figure shows the original demarcation line at $0.8x[Si]+[Cr] \geq \mathbf{2.6}$ whereas in the present claims the inequality has been amended to $0.8x[Si]+[Cr] \geq \mathbf{3.0}$. Thus, the line of demarcation pertinent to the presently amended inequality is moved up substantially with respect to the line shown in the Figure, and has been entered by hand (the dashed line).



This fact, by itself, is sufficient to establish to the patentability of the present claims regardless whether the references broadly disclose compositional ranges that overlap with the presently claimed compositional ranges because neither applied reference discloses or suggests the relation noted above regarding the contents of silicon and chromium present in every pending claim. Note especially the superior fatigue life uniformly obtained for the claimed compositions and the substantial differences obtained for closely related compositional formulae.

In addition, the Table 1 of data at specification page 9 presents 19 examples, many if not all of which the Examiner would consider suggested by the applied references. However, the results provided by this Table make it clear that there are distinct differences in properties between steels falling within such broad compositional limitations:

TABLE 1

	Chemical compositions (% by mass)*										Grain size
Examples	C	Si	Mn	P	S	Ni	Cr	V	Mo	Al	number
1	0.75	2.00	0.75	0.010	0.009	0.00	1.50	0.21	0.00	0.003	10.5
2	0.60	1.95	0.69	0.008	0.007	0.00	1.24	0.32	0.00	0.002	10.5
3	0.59	1.44	0.68	0.008	0.011	0.00	3.10	0.18	0.00	0.002	11.0
4	0.53	2.07	1.22	0.005	0.006	0.00	1.81	0.11	0.00	0.002	11.0
5	0.72	1.85	0.85	0.006	0.011	0.18	1.69	0.24	0.00	0.003	10.5
6	0.52	2.26	0.94	0.008	0.005	0.00	2.05	0.23	0.28	0.035	10.0

TABLE 1-continued

7	0.61	2.00	0.85	0.013	0.005	0.25	1.05	0.11	0.00	0.001	10.5
8	0.78	1.24	0.67	0.007	0.008	0.00	2.01	0.16	0.00	0.003	11.0
9	0.63	2.43	0.71	0.009	0.007	0.43	1.12	0.12	0.00	0.003	10.5
10	0.61	2.05	0.32	0.008	0.010	0.00	1.68	0.27	0.00	0.002	12.0
11	0.68	1.37	0.47	0.015	0.012	0.00	1.51	0.17	0.00	0.003	11.5
12	0.55	1.45	0.70	0.010	0.009	0.00	0.70	0.00	0.00	0.003	9.5
13	0.63	1.40	0.60	0.007	0.012	0.00	0.65	0.11	0.00	0.003	10.0
14	0.60	1.50	0.70	0.011	0.010	0.25	0.90	0.06	0.00	0.041	10.0
15	0.59	1.29	0.75	0.008	0.014	0.00	1.51	0.00	0.09	0.002	10.5
16	0.72	0.80	0.78	0.006	0.009	0.00	1.49	0.05	0.15	0.002	11.0
17	0.65	2.01	0.90	0.005	0.005	0.00	0.80	0.15	0.00	0.001	10.0
18	0.59	1.51	0.83	0.007	0.012	0.00	1.31	0.23	0.00	0.003	10.5
19	0.68	1.25	1.22	0.011	0.009	0.00	1.16	0.35	0.00	0.003	10.5

Examples	Calculated 0.8Si + Cr	Fatigue life ($\times 10^6$ cycles)	Initiation of fracture	Residual shear strain (%)	Residual shear strain after nitriding (%)
1	3.1	20	—	0.041	0.038
2	2.8	20	—	0.037	0.051
3	4.3	20	—	0.029	0.030
4	3.5	20	—	0.045	0.039
5	3.2	20	—	0.025	0.033
6	3.9	20	—	0.038	0.029
7	2.7	20	—	0.047	0.059
8	3.0	20	—	0.033	0.041
9	3.1	20	—	0.041	0.063
10	3.3	20	—	0.029	0.031
11	2.6	20	—	0.039	0.041
12	1.9	5.0	Surface	0.075	0.079
13	1.8	7.8	Surface	0.064	0.081
14	2.1	7.0	Oxide inclusions	0.065	0.075
15	2.5	10.3	Surface	0.059	0.059
16	2.1	4.3	Surface	0.084	0.081
17	2.4	1.7	Oxide inclusions	0.049	0.055
18	2.5	8.3	Oxide inclusions	0.055	0.055
19	2.2	12.7	Surface	0.102	0.105

*The balance is Fe and inevitable impurites.

As is apparent from Table 1 and FIG. 1 above as amended to reflect the inequality of the presently amended claims, the spring steels obtained in Examples 12 to 14 and 16 to 17 have shorter fatigue lives because of differences in at least Si or Cr. As shown in Examples 15 and 18 to 19, these spring steels also show a need for further improvement in fatigue life, with a fracture (a fracture below fatigue limit) originating from oxide inclusions occurring in Example 18. In contrast, as shown in the Examples corresponding to the amended claims, the

spring steels according to the invention and containing Si and Cr within the claimed limits and relationship showed significantly improved fatigue life and sag resistance. Springs obtained in Examples 1, 3 to 6, 8, and 10 to 11, which contain Cr in an amount of 1.5% or more as claimed were also improved in the sag resistance after nitriding. Compare Examples 2, 7, and 9.

As explained in Applicants' previous response, Nagao relies upon the presence of inclusions, while minimizing aluminum *reduces* the formation of oxides (see specification page 5, bottom). Nagao thus teaches away from Applicants' aluminum limitation even if broadly encompassed within a disclosed overall range of less than or equal to 0.1%., which is important, because Table 1 above shows that it is quite possible to operate inside the broad compositional limitations of Nagao yet obtain very poor materials. Nagao does not disclose or suggest the particular combinations here claimed, nor does the reference recognize the substantial benefits obtained when one does operate within the presently claimed ranges (see both the Figure and Table above). As explained above, the fact that Nagao does not recognize or suggest the benefits stemming from Applicants' composition *establishes* patentability. See MPEP 716.02.

The Examples of record in the present specification demonstrate that spring steels containing contents of Si and Cr in the amounts presently claimed and, importantly, present an amount such that the formula $0.8[Si] + [Cr] \geq 3.0$ is met are significantly improved in both fatigue life and sag resistance. On the other hand, very similar spring steels also falling within the broad disclosures of the applied references but which do not meet the presently claimed limitations with regard to Si and Cr, etc. show quite poor fatigue life. As neither Nagao nor Hashimura disclose or suggest that such substantially improved properties can be obtained by operating within the limitations discovered by Applicants, the pending claims are deserving of allowance as they describe a significant advance in the art.

Accordingly, and in view of the differences between what is claimed herein and what is disclosed by the references Applicants respectfully submit that the present application is in condition for allowance, and early notification to this effect is respectfully requested.

Respectfully submitted,

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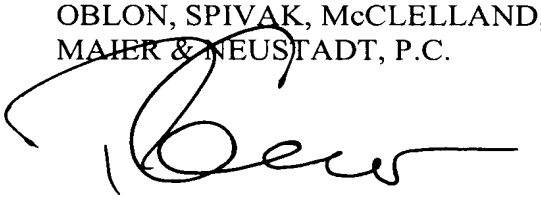

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